IOP Conference Series: Materials Science and Engineering 2018 vol.412 N1

Thermal and hydraulic efficiency of the staggered tube bundle in pulsating flow

Haibullina A., Ilyin V., Sabitov L., Zinnatullin N., Hayrullin A., Dolgova A.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© Published under licence by IOP Publishing Ltd. Determination of the thermal and hydraulic efficiency η is one of the ways to assess the effectiveness of the method used to intensify heat transfer. In this paper, the hydraulic fluid efficiency of diamond-coated tube bundles is determined for a pulsating flow of a heat carrier. The Reynolds number was based on the outer diameter of the pipe and was Re = 100, the Prandtl number Pr ranged from 214 to 363. It was shown that an increase in the dimensionless amplitude β, frequency f, and pulsating ratio ψ leads to a decrease in thermal and hydraulic efficiency. The influence of the Prandtl Pr numbers on the thermohydraulic efficiency was also analyzed. It is shown that an increase in thermal and hydraulic efficiency is observed with increasing Pr.

http://dx.doi.org/10.1088/1757-899X/412/1/012027

References

[1] Wantha C 2016 Int. J. Heat Mass Transfer 99 141-148
[2] Musaeva D A, Sinyavin A A and Guriyanov A I 2012 Modern Science: Researches, Ideas, Results, Technologies 2 183-186
[3] Khaibullina A, Khairullin A et al 2014 The European Phys. J. Conf. 7601004
[4] Khaibullina A I and Ilyin V K 2014 Energy Problems 1 211-19
[5] Khaibullina A I, Khayrullin A R and Ilyin V K 2016 Energy Problems 11 1264-75
[6] Khaibullina A I et al 2015 X-th International Youth Sci. Conf.: TinchurinReadings 2 167
[7] Kolchin S A 2015 Hydraulic resistance of discrete-rough channel with superimposed pulsations of flow: dis. for the Candidate. tech. Sciences: 01.02.05, 01.04.14
[8] Ilyin V K, Sabitov L S, Haibullina A I and Hayrullin A R 2017 IOP Conf. Ser.: Mater. Sci. Eng. 240 012025
[9] Ilyin V K, Sabitov L S, Haibullina A I and Hayrullin A R 2017 IOP Conf. Ser.: Mater. Sci. Eng. 240 012027